77TH CONGRESS } HOUSE OF REPRESENTATIVES { DOCUMENT
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MORRO BAY, CALIF.

LETTER

FROM

THE SECRETARY OF WAR

TRANSMITTING

A LETTER FROM THE CHIEF OF ENGINEERS, UNITED STATES ARMY, DATED APRIL 1, 1941, SUBMITTING A REPORT, TOGETHER WITH ACCOMPANYING PAPERS AND AN ILLUSTRATION ON RE-EXAMINATION OF MORRO BAY, CALIF., REQUESTED BY RESOLUTION OF THE COMMITTEE ON RIVERS AND HARBORS, HOUSE OF REPRESENTATIVES, ADOPTED APRIL 28, 1936

JUNE 19, 1941.—Referred to the Committee on Rivers and Harbors and ordered to be printed, with an illustration

WAR DEPARTMENT,
Washington, June 14, 1941

The SPEAKER OF THE HOUSE OF REPRESENTATIVES.

DEAR MR. SPEAKER: I am transmitting herewith a report dated April 1, 1941, from the Chief of Engineers, United States Army, on reexamination of Morro Bay, Calif., requested by resolution of the Committee on Rivers and Harbors, House of Representatives, adopted April 28, 1936, together with accompanying papers and illustration.

The Bureau of the Budget has been consulted and advises that, in view of the relation of the project to the national defense, there would be no objection to the submission of the proposed favorable report to the committee, with the understanding that no commitment would be made thereby with respect to the amount that would be required to carry out the national-defense features of the project.

Sincerely yours,

HENRY L. STIMSON,
Secretary of War.

WAR DEPARTMENT,
OFFICE OF THE CHIEF OF ENGINEERS,
Washington, April 1, 1941.

The CHAIRMAN, COMMITTEE ON RIVERS AND HARBORS,
House of Representatives, Washington, D. C.

MY DEAR MR. CHAIRMAN: 1. The Committee on Rivers and Harbors of the House of Representatives, by resolution adopted April 28, 1936, requested the Board of Engineers for Rivers and Harbors to review the reports on Morro Bay, Calif., submitted December 28, 1934, and previous reports, with a view to determining if improvement work in the interest of navigation is advisable at this time. I enclose the report of the Board in response thereto.

2. Subsequent to the report of the district and division engineers, the Acting Secretary of the Navy, in a letter dated January 31, 1941, addressed to the Secretary of War, stated:

> The importance of this project to the Navy Department has increased considerably, in connection with national-defense measures, during the recent months. The Navy's primary need for the development of Morro Bay by the proposed project is to provide a protected harbor for local defense and patrol vessels. Active development of plans for the establishment of a base on shore at Morro Bay for patrol craft is in progress. It is recommended that the project be modified to include dredging the small additional area as shown cross-hatched, and that the 12-foot channel be dredged to 16 feet, to the point as indicated on the attached print, which has been prepared to show proposed location of naval shore facilities at Morro Bay.

3. After full consideration of the reports secured from the district and division engineers, and the recommendation of the Acting Secretary of the Navy, the Board recommends the improvement of Morro Bay, Calif., to provide an entrance channel through the existing entrance to the bay, protected by a breakwater extending south by west from Morro Rock, and bay channels and basins at locations and of dimensions substantially as shown on the accompanying map; all at an estimated first cost of $976,000 with $25,000 annually for maintenance; subject to the conditions, with respect to that part of the channel and basin beyond the limits of the 16-foot depth, that local interests give assurances satisfactory to the Secretary of War that they will: (*a*) furnish free of cost to the United States all lands, easements, and rights-of-way necessary for the construction and for subsequent maintenance, when and as required; (*b*) construct and maintain a roadway to and along the Morro waterfront to give proper access to the improvement; and (*c*) provide and maintain adequate facilities for the mooring and servicing of vessels, at terms reasonable and equal to all.

4. After due consideration of these reports, I concur in the views and recommendations of the Board.

Very truly yours,

J. L. SCHLEY,
Major General,
Chief of Engineers.

REPORT OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS

WAR DEPARTMENT,
THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS,
Washington, March 3, 1941.

Subject: Morro Bay, Calif.
To: The Chief of Engineers, United States Army.

1. This report is in response to the following resolution, adopted April 28, 1936:

Resolved by the Committee on Rivers and Harbors of the House of Representatives United States, That the Board of Engineers for Rivers and Harbors, created under section 3 of the River and Harbor Act, approved June 13, 1902, be, and is hereby, requested to review the reports on Morro Bay, California, submitted December 28, 1934, and previous reports, with a view to determining if improvement work in the interest of navigation is advisable at this time.

2. Morro Bay is on the coast of California, nearly midway between San Francisco and Los Angeles. It is 110 miles south of Monterey Bay and 120 miles northwest of Santa Barbara Harbor. The bay is about 4 miles long and at its midsection is 2 miles wide, with its long axis parallel to the coast line. The sand spit which separates the bay from the ocean extends from the mainland a distance of nearly 4 miles to a point where it is overlapped by Morro Rock. Morro Rock is a peak that formerly lay detached, 1,000 feet or more offshore, but which has been connected to the mainland by a stone dike behind which littoral drift has built up a wide beach. Controlling depth in a tortuous channel which passes close to Morro Rock is 8 feet for a width of 125 feet and the same depth is available in a narrow channel that extends south a distance of 1 mile along the inner side of the sand spit and then crosses in a southeasterly direction to the mainland. Elsewhere the bay is generally shallow channels, tidelands, sloughs, and marshes. The mean range of tide is 4.7 feet. The stone dike was constructed by the county in 1935 to close the former north entrance channel in the hope of stabilizing and improving the south channel. There have been no other improvements in the locality for navigation.

3. Both the sand spit and Morro Rock are being developed as a State park. The village of Morro on the eastern shore is the only community immediately adjacent to the bay. It has a population of 920. San Luis Obispo, with a population of 9,500; Atascadero, with 2,300; and Paso Robles, with 3,000, are all inland towns in the adjacent county. The upper San Joaquin Valley, with a population of 500,000, lies inland from that part of the coast centered about Morro Bay. Modern highways serve the entire area. In former years there was commercial movement of lumber, grain, and other commodities into Morro Bay but present commerce is limited to the activities of 9 small vessels engaged in abalone fishing.

4. The Board of Supervisors of San Luis Obispo County and local interests represented by the chambers of commerce and similar organizations in the county and throughout the upper San Joaquin Valley request improvement of Morro Bay to restore its former commercial usefulness and to provide harbor facilities for recreational craft and small commercial vessels. They urge that improvement of the harbor in conjunction with development of the adjacent State park would provide desirable and much needed facilities for an attractive form of

recreation; that a safe harbor for small boats is urgently needed in the long stretch of coast between Monterey and Santa Barbara; and that improvement of the harbor will restore the commercial fishing industry of the locality as it has done in cases of similar improvement elsewhere. No offers of specific contribution to the cost of improvement have been made.

5. The district engineer has considered various plans of improvement. In his opinion the most satisfactory entrance channel would be one lying just southeast of Morro Rock which, together with a short breakwater to be constructed, will shelter it from the more frequent winds. Depths of 16 feet in the entrance and 12 feet in the inner channels and anchorages will be adequate for the largest yachts and fishing vessels that are expected to seek the harbor. A width of 350 feet in the entrance will be required in order to reduce tidal currents to velocities safe for small-boat navigation. Inner channels and turning basins are designed of sufficient dimensions to afford safe and convenient accommodations for the increasing number of vessels that are expected to visit the bay. The estimated cost for the breakwater and for necessary dredging is $756,000 and for annual cost of maintenance is $20,000. To establish necessary aids to navigation will cost an additional $15,000. The total Federal annual charge is estimated at $55,000. Reviewing the experience in harbor developments similar to that proposed, the district engineer points out that a substantial investment in new craft and continuing expenditures for operation and maintenance may be expected to result from the improvement. An increase in the size of the commercial fishing fleet based in the bay and of the value of its catch may also be expected. The district engineer notes that accomplishment of the proposed work will require cooperation in various items, such as the furnishing of rights-of-way and disposal areas; the construction and maintenance of access roads, slips, and moorings; and provisions for supply of visiting vessels. He believes that local interests should be required to provide the cooperation but that the general benefit of the project is sufficient to warrant undertaking of the channel and breakwater improvement at Federal expense. He recommends the improvement, subject to certain requirements, of local cooperation. The division engineer concurs.

6. Subsequent to the report of the district and division engineers, the Acting Secretary of the Navy, in a letter dated January 31, 1941, addressed to the Secretary of War, stated:

> The importance of this project to the Navy Department has increased considerably, in connection with national-defense measures, during the recent months. The Navy's primary need for the development of Morro Bay by the proposed project is to provide a protected harbor for local defense and patrol vessels. Active development of plans for the establishment of a base on shore at Morro Bay for patrol craft is in progress. It is recommended that the project be modified to include dredging the small additional area as shown cross-hatched, and that the 12-foot channel be dredged to 16 feet, to the point as indicated on the attached print, which has been prepared to show proposed location of naval shore facilities at Morro Bay.

7. Since the completion of the survey the stone dike that connects Morro Rock to the mainland was breached by large waves during a severe storm and about 100,000 cubic yards of sand were washed into the bay. Improvement of the bay will now require removal of this

sand and reconstruction of the dike. It has been found that the accelerated construction program has increased unit costs which must be provided for in cost estimates.

VIEWS AND RECOMMENDATIONS OF THE BOARD OF ENGINEERS FOR RIVERS AND HARBORS

8. The Board has given careful consideration to the reports of the district and division engineers and to the recommendation of the Acting Secretary of the Navy. The additional work desired by the Navy is indicated on the accompanying map. The cost of this additional work, of the restoration of the Morro Rock dike, and of increased construction costs is estimated at $220,000, making the total estimated cost of the project $976,000. In view of the statement of the Acting Secretary of the Navy and as an element in the national defense, the Board of Engineers for Rivers and Harbors recommends the improvement of Morro Bay, Calif., to provide an entrance channel through the existing entrance to the bay, protected by a breakwater extending south by west from Morro Rock, and bay channels and basins at locations and of dimensions substantially as shown on the accompanying map; all at an estimated first cost of $976,000 with $25,000 annually for maintenance; subject to the conditions, with respect to that part of the channel and basin beyond the limits of the 16-foot depth, that local interests give assurances satisfactory to the Secretary of War that they will: (*a*) furnish free of cost to the United States all lands, easements, and rights-of-way necessary for the construction and for subsequent maintenance, when and as required; (*b*) construct and maintain a roadway to and along the Morro water front to give proper access to the improvement; and (*c*) provide and maintain adequate facilities for the mooring and servicing of vessels, at terms reasonable and equal at all.

For the Board:

THOMAS M. ROBINS,
Brigadier General, Corps of Engineers,
Senior Member.

REEXAMINATION OF MORRO BAY, CALIF.

SYLLABUS

The district engineer finds that navigation in Morro Bay, Calif., is less satisfactory than in the past; that navigation through the entrance channel is difficult and dangerous, and at times, impossible; and that there are no satisfactory channels and no turning basins in the bay. He believes that if the entrance channel were improved, and bay channels and a turning basin were provided, the bay would be extensively used for commercial fishing, recreational boating, and for a harbor of refuge for the smaller craft, its deterioration corrected, and that development of the surrounding area would be stimulated. The district engineer considered three plans of improvement. He recommends improvement of the existing entrance and provision of channels in the bay to permit access to the Morro water front; and that local cooperation be required, consisting of rights-of-way, construction of roads to provide access to the water front, and necessary public facilities for navigation, all at an estimated cost of about $50,000. The estimated cost to the United States for dredging and breakwater construction is $756,000 for new work and $20,000 annually for maintenance.

WAR DEPARTMENT,
UNITED STATES ENGINEER OFFICE,
Los Angeles, Calif., June 15, 1940.

Subject: Review of reports on Morro Bay, Calif.
To: The Chief of Engineers, United States Army, Washington, D. C.
(Through the Division Engineer, South Pacific Division, San Francisco, Calif.)

AUTHORITY

1. This report is submitted pursuant to the resolution of the Committee on Rivers and Harbors, House of Representatives, adopted April 28, 1936, which reads:

Resolved by the Committee on Rivers and Harbors of the House of Representatives, United States, That the Board of Engineers for Rivers and Harbors, created under section 3 of the River and Harbor Act, approved June 13, 1902, be, and is hereby requested to review the reports on Morro Bay, California, submitted December 28, 1934, and previous reports, with a view to determining if improvement work in the interest of navigation is advisable at this time.

2. *Reports under review.*—The report submitted December 28, 1934, was a review of the survey report of 1920. Both of these reports concerned improvements for a commercial harbor, and both were unfavorable.

DESCRIPTION

3. *Maps.*—Morro Bay is shown on map, enclosure 1, on United States Geological Survey quadrangle Cayucos, Calif., and on United States Coast and Geodetic Survey Charts 5387 (Estero Bay) (1938), and 5302 (Point Concepcion to Point Sur) (1938).

4. *Location.*—Morro Bay is on the Pacific coast in San Luis Obispo County, Calif. It is southerly 110 miles from Monterey Bay and 200 miles from San Francisco, 20 miles northerly of Port San Luis, and is northwesterly 120 miles from Santa Barbara Harbor and 210 miles from Los Angeles Harbor.

5. *Natural features.*—Morro Bay is a landlocked bay, 3½ square miles in area. It includes about 3 square miles of channels and tidelands and one-half square mile of sloughs and marshlands. It extends about 4 miles south from the entrance, paralleling the coast, and has a width varying up to a maximum of about 2 miles near its midsection. The entrance is now adjacent to and around the southeasterly side of Morro Rock, a rock peak, roughly circular in plan, about 45 acres in area, and 576 feet high, which is connected to the mainland by a dike and sand accretion. The sandspit, which separates Morro Bay from the ocean, extends southerly from the bay entrance 4 miles to the mainland. The sandspit is from 500 to 2,000 feet wide and is composed of dunes varying in height to over 100 feet. The town of Morro is on the mainland shore along the easterly side of the bay, about four-fifths mile from the entrance. (See map (in 4 sheets), enclosure 1.)[1] At the bay entrance, the diurnal tide range is about 4.7 feet and the extreme range about 8.5 feet.

6. *Entrance channel.*—The entrance channel to Morro Bay passes around and close to the southeasterly and easterly sides of Morro Rock. In August 1938 the channel depths were 6 feet for a width of 165 feet, and 8 feet for a width of 125 feet at mean lower low water.

[1] Only sheet 1 printed.

7. *Bay channels.*—At the bayward end of the entrance channel, landward of Morro Rock, and at tip of the peninsula, there is a small basin with depths to 25 feet. From this basin a channel, with a controlling depth of 8 feet, extends southerly along the bayward side of the sandspit about 1 mile, thence it crosses southeasterly to the mainland shore, along which it extends southerly a short distance past White Point. There is now no channel extending to, or passing the water front of the town of Morro.

8. *Navigation difficulties.*—The entrance to the bay is now unprotected, except, in part, from northwesterly storms by Morro Rock. The ocean end of the entrance channel is exposed to rough and dangerous seas in all except the calmer weather. There are many days during the year when it is impossible for boats to enter or leave the bay. The entrance channel is crooked and close to the rocky shore of Morro Rock, and it is therefore dangerous. The small cross section of the channel causes tidal currents, which are frequently of such strength that sailing craft and slow-speed power boats cannot enter the bay against the ebb tide. Access by boat to the town of Morro is not practicable, and suitable anchorage in the bay is found only after proceeding about 1½ miles into the bay through a crooked, narrow, and shifting bay channel. Tidal velocities in the bay channels as far south as White Point are such that the operation and mooring of small craft is difficult.

9. *Weather.*—Weather in the vicinity of Morro Bay is generally moderate, often foggy, and the prevailing wind is from the northwest. Being in an indentation in the coast, called Estero Bay, Morro Bay is seldom subject to the full force of southerly or northerly storms. Most of the offshore storms are from the northwest, and storms from the southwest are infrequent, but more severe.

10. *Silting and erosion in the bay.*—No reliable data are available concerning the filling of the bay by silt and sand. Old time local residents report only minor filling caused by the run-off of storms occurring over the 72 square miles of hilly watershed which drains into the bay. Changed channel conditions in the bay are, apparently, due principally to shifting of the channels and to some degree by the shoaling of the bay by drifting sand from the dunes on the sandspit. South of Morro the tidal currents in the crooked bay channel are causing erosion of the mainland shore.

11. *Bridges.*—There are no bridges existing or proposed across Morro Bay and entrance thereto.

12. *Former condition of the bay.*—In its natural condition the entrance to the bay was landward of Morro Rock and the seaward part of the entrance channel divided and passed around both sides of Morro Rock. The size of the channels adjacent to the rock depended upon sand movement, one being small when the other was large, the larger usually having a controlling depth of 7 to 9 feet, with occasional depths of 10 feet. From the entrance channel a natural channel with a controlling depth of 12 feet extended directly to the town of Morro, and from Morro two smaller channels provided access to the more southerly parts of the bay. A stone dike constructed across the north channel in 1935 confined the entrance channel to the southeasterly side of Morro Rock, somewhat stabilizing its depth. However, its width and the location of the shoals therein still vary.

TRIBUTARY AREA

13. *Description.*—There is practically no tributary area pertaining to general commerce. However, the tributary area pertaining to boating and recreation is large. Morro Bay and vicinity is used for recreation by residents of San Luis Obispo County, and also by the many residents of the San Joaquin Valley, since, for them, it is the closest seashore. It is also used by residents of the nearer inland areas of Santa Barbara and Monterey Counties, and by visitors from other parts of the State. (See vicinity map, inset on enclosure 1.)

14. *Cities, towns, and population.*—The town of Morro (unincorporated), population 920,[1] is on the mainland bay shore. Inland and southeasterly about 13 miles is the city of San Luis Obispo, population 9,520.[1] Northeast, and inland about 15 miles by highway, is the town of Atascadero, population 2,300,[1] and 11 miles north of Atascadero is Paso Robles, with a population of 2,954.[1] The total value of property in San Luis Obispo County was over $81,000,000, and in the Morro school district, over $1,000,000 in 1939–40.

15. Population of that part of the tributary area which is in the San Joaquin Valley is estimated at 500,000, and includes principal cities with populations [1] as follows:

Fresno	57,510	Visalia	9,442
Hanford	7,200	Tulare	7,697
Porterville	6,580	Bakersfield	37,720

16. Each summer, approximately 6,000 men receive military training at the California National Guard camp, inland about 10 miles from Morro toward San Luis Obispo. During the training period about 1,500 people visit the camp.

17. *Resources and industries.*—Oil production, cattle raising, and agriculture are the principal industries of the tributary area. The mountainous coastal area, extending inland about 55 miles from the coast, is less productive than the San Joaquin Valley. Some commercial fishing is carried on from Morro Bay and Port San Luis, and a few boats from more distant harbors fish in the coastal waters tributary to Morro Bay.

18. *Communications.*—Morro Bay has no rail connection. The Pacific Coast Line of the Southern Pacific Railroad passes through San Luis Obispo, about 13 miles inland. Morro Bay is the southern terminus of a recently completed scenic coastal highway, extending northward to Monterey. There are direct highways from Morro to the main coast highway, U S 101, at San Luis Obispo and at Atascadero. Various paved highways extend from U S 101, across the coastal mountains to the highway net in San Joaquin Valley.

PRIOR REPORTS

19. There have been no prior reports submitted within the past 5 years. (See enclosure 10 for details of the five prior reports.)[2]

EXISTING PROJECT

20. There is no existing, nor has there been any prior, Federal project for harbor improvement at Morro Bay, and harbor lines have not been established. Since there has been no Federal harbor project for

[1] Estimate for 1938, based on California Taxpayers' Association, Inc., estimate, and 1930 census.
[2] Not printed.

Morro Bay, there have been no contributions made under prescribed conditions.

OTHER IMPROVEMENTS

21. *Stone dike.*—In 1935–36 the county, at a cost of about $50,000, and as a relief project, rebuilt and completed a 1,700-foot stone dike connecting Morro Rock to shore, in order to close the natural north entrance channel and thereby improve the south entrance channel.

22. *Piers.*—The small piers along the Morro water front, formerly used in handling commerce, have deteriorated and largely disappeared. The structures remaining are in poor condition and are valueless for use in connection with the desired improvement. A few small private piers along the channel, south of Morro, are used by fishing craft.

23. *Park.*—Adjacent to Morro Bay the State is developing a large park, known as Morro Bay Park, which includes Morro Rock and extensive bay and ocean frontages. The park contains about 1,500 acres, and has about 23,000 linear feet of bay frontage and 17,000 linear feet of ocean shore. (See map, enclosure 1.) The principal improvements consist of a golf course, clubhouse, tennis courts, and camping ground. The total State expenditure is reported (1939) to exceed $132,000, including cost of the land.

COMMERCE

24. Prior to the deterioration of the bay channels, and before the improvement of the highways and development of commercial trucking, lumber was shipped into Morro Bay and grain and other commodities were shipped out. Statistics concerning the amount of commerce are not available, but the amounts were not large. During 1937 abalone fishing was carried on by 9 boats, employing 58 men, and the catch amounted to 520 gross tons, with a value of $40,000. It is reported that operations were hindered and restricted by inability to enter and leave the bay at will, and that the year's catch was only a small percentage of that of former years, before navigation became so difficult and hazardous. During 1937 Morro fishermen also caught 150 tons of miscellaneous fish, valued at $20,000, but landed them at other ports because of navigation difficulties at the bay.

25. *Prospective commerce.*—The tendency to continue to use existing lines of transportation makes it improbable that any appreciable volume of general commerce, other than that which pertains to fishing activities and supplies for pleasure boating, would pass through Morro Bay in the near future, even if it were improved for such purpose. Small amounts of lumber might be brought in, and some ore and grain might be sent out; but the quantities would be insufficient to justify the cost of the necessary improvements. However, improvement of the bay and entrance for small craft would cause an increase in the fish catch. The future of this industry is difficult to estimate because the supply of fish along the coast is said by some authorities to have been depleted during recent years. Being halfway between Santa Barbara and Monterey, the port would be used by an increasing number of fishing boats, and the resultant increase in fish landings would probably justify operating one, or possibly more canneries adjacent to the bay.

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VESSEL TRAFFIC

26. Present vessel traffic consists of only a few pleasure and commercial fishing boats and a small number of other pleasure craft. It is reported that, of the 110 boats using the bay, 33 vary in length from 16 to 40 feet, and include 22 commercial fishing craft, 4 passenger fish boats, and 7 pleasure boats. The other 77 craft include 14 rowboats for hire and 63 private rowboats, 14 of which have outboard motors. It is also reported that about 10 commercial launches or tugs from nearby oil-loading points winter at Morro Bay, or come there occacionally to be beached for repairs.

IMPROVEMENT DESIRED

27. *General.*—Local interests, consisting principally of the Board of Supervisors of San Luis Obispo County and the local chambers of commerce, and similar agencies throughout the tributary area, desire that the Federal Government adopt and complete a project at Morro Bay that will restore the bay to its former usefulness and prevent further deterioration, and thus provide harbor facilities for yachts, power cruisers, pleasure and fishing boats, and other small craft for commercial and fishing purposes.

28. *Public hearing.*—A public hearing was held on August 4, 1938, at the county courthouse in San Luis Obispo, in connection with this report. It was attended by 96 persons, including public officials of San Luis Obispo and Kern Counties, and other representatives of State, county, and local agencies interested in the desired improvements. (See enclosure 3, and exhibits therewith.) [1]

29. *Desired improvement.*—The plan of the board of supervisors submitted at the time of the hearing included provisions for a dike across the bay, which caused numerous objections by other local interests. (See enclosure 3, and exhibits.) [1] As a result of these objections a modified plan was later submitted, eliminating the dike. (See enclosure 4.) [1] The modified plan of desired improvements, and its costs, as estimated by local interests, are as follows:

(*a*) A stone jetty, extending west from the peninsula, a distance of 1,304 linear feet, to a point approximately 500 feet southerly of Morro Rock.

(*b*) A stone breakwater, extending southerly from the southern side of Morro Rock, a distance of 524 linear feet.

(*c*) A channel 15 feet deep, extending from the harbor entrance to a turning basin in the bay (item (*d*)), a distance of about 3,000 feet.

(*d*) A turning basin in the bay, 10 feet deep and not less than 1,000 feet square.

(*e*) A channel, 10 feet deep and 100 feet wide, parallel with and adjacent to the shore of the mainland, extending southerly from the south end of said basin (item (*d*)), a distance of about 5,700 feet, and connecting with a natural channel.

(*f*) A bulkhead, 3,000 feet in length along the water front of the northeastern shore, in front of the town of Morro.

(*g*) The entire upper part of the bay dredged to a depth of 5 feet.

Estimated cost of improvements desired

(See enclosure 4) [1]	*Estimated cost by local interests*	
Dredging, excavation	$249, 645. 90	
Breakwater, embankment	88, 556. 88	
Bulkhead	126, 689. 10	
		$464, 891. 88
Incidentals, 10 percent		46, 489. 19
Engineering and supervision		15, 000. 00
Total		526, 381. 07

[1] Not printed.

30. *Statements in justification of improvement.*—Local interests agree in favoring an improvement that will provide a harbor suitable for yachts and other pleasure boats and commercial fishing craft. They state that natural deterioration of Morro Bay and the dangerous entrance channel is preventing the full use of the valuable harbor, which is located on a long stretch of coast that is lacking in suitable harbors for small craft, and that improvement of the bay and entrance thereto will cause an increase in the number of small boats, as well as increase pleasure-boat travel from the Atlantic coast and foreign countries to the Pacific coast.

31. It is claimed that the present and potential boat owners, among the 500,000 population of the tributary territory, will have a closer home port at Morro Bay than at Monterey, Santa Barbara, or Los Angeles Harbors, and that the improvement of a harbor, adjacent to the State park, will provide ideal conditions for a recreational area.

32. It is claimed that commercial fishing at Morro Bay will be restored, as it was at Newport Bay and Monterey after those harbors were improved. (See enclosure 3, exhibit 1, pp. 7 and 16.)[1]

33. It is also claimed that the proposed improvement can be made at nominal cost, because of existing bay conditions; that the initial cost would be only about $1 for each person to be benefited thereby; and that the maintenance cost would be unusually small because of favorable natural conditions.

34. *Other proposals.*—In addition to the foregoing, several alternate proposals were received from various interested individuals. (See enclosure 6 *c* and exhibits 7 and 9 of enclosure 3.)[1]

35. *Local cooperation offered.*—One of the supervisors, who represented San Luis Obispo County, stated at the hearing that if the desired improvement is approved as a United States project and the county "can see its way clear" to finance part of the proposed project, the County Board of Supervisors will sponsor the improvement. The California State Chamber of Commerce has offered to cooperate through the facilities of their organization, in connection with any investigations or negotiations that may be undertaken toward improvement of Morro Bay as a harbor. Chambers of commerce and other civic organizations in the tributary area have stated that they will support and endorse any plan that may be undertaken for development of Morro Bay. A representative of the State Park Commission stated that the Commission is willing to cooperate in every way, so that the people who use the State parks, as well as those residing in the adjacent inland counties, may derive more recreation from the area. It was further stated that the State Park Commission could not contribute any funds toward the improvement, but that, later, it might establish a Civilian Conservation Corps camp in the vicinity, and will aid in every other way possible. (See exhibits 2, 3, 4, 5, and 6 of enclosure 3.)[1]

PLAN OF IMPROVEMENT

36. *General.*—Local interests have properly based their plan on the assumption that there is now no economic justification for a deep-draft commercial harbor at Morro Bay, and that its improvement must be justified on the basis of benefits from recreational boating and fishing and a limited commerce.

[1] Not printed.

37. *Local interests' plan of improvement.*—Surveys made in connection with this report disclose that the entrance plan submitted by local interests would not provide the degree of protection required for a recreational boating and fishing harbor and that the entrance channel had insufficient cross section to provide safe and suitable tidal velocities. Also, local interests' estimate of cost was too low.

38. *Plans considered.*—The district engineer considered three general plans of improvement. These are described below and will be hereinafter referred to as plans A, B, and C.

(*a*) *Plan A.*—This plan provides for improving the existing entrance channel to provide a depth of 16 feet and a width of 350 feet. The entrance would be protected by a stone breakwater 1,000 feet long extending about south by west from the soutwesterly part of Morro Rock. Easterly of Morro Rock and southeasterly of the stone dike the channel would be widened to form a basin 16 feet deep, and from the easterly end of this basin a channel 12 feet deep and 200 feet wide would extend southeasterly to a turning basin along the Morro water front. The turning basin would be 12 feet deep and 500 feet square. From the turning basin a channel 12 feet deep and 150 feet wide would extend southerly about 2,800 feet along the mainland shore to connect with the existing channel, and continue with the same depth and width for about 2,350 feet southeasterly, in order to reduce erosive tidal velocities in the natural channel in that vicinity. (See enclosure 1, sheet 1.)

(*b*) *Plan B.*—Plan B provides for an entrance channel 16 feet deep and 350 feet wide along the northerly side of Morro Rock. The channel would be protected on the north by a stone breakwater extending from shore to a depth of 20 feet. The channel would be cut through the sand accretion and stone dike, and easterly of Morro Rock and southeasterly of the dike there would be a basin 16 feet deep, 350 feet wide, and 850 long. On the same alinement as the entrance channel, a bay channel 12 feet deep and 350 feet wide would extend 1,200 feet southeasterly, thence a channel 10 feet deep and 150 feet wide would extend southerly to connect with the existing channel along the peninsula bay shore. A channel 12 feet deep and 200 feet wide would continue from the end of the 350-foot channel southeasterly to a turning basin along the Morro water front, 12 feet deep and 500 feet square. A channel 12 feet deep and 150 feet wide would extend from the turning basin, 2,800 feet southerly along the mainland shore, to connect with the existing natural channel, and continue with the same depth and width for about 2,350 feet southeasterly in order to reduce erosive tidal velocities in the natural channel in that vicinity. The existing entrance would be closed with waste rock and dredged material. (See enclosure 1, sheet 2.)[1]

(*c*) *Plan C.*—This plan would provide an entrance channel 16 feet deep and 350 feet wide through the sandspit about 3,000 feet south of Morro Rock. The entrance channel would be protected by stone jetties, 1,000 feet apart, extending to a depth of 20 feet and on the landward extension of the jetties and for 300 feet along the peninsula bay shore, stone revetments would protect the channel banks from erosion. A channel 16 feet deep and 150 feet wide would extend southeasterly from the entrance channel to connect with existing deep water along the mainland shore. Northerly of the 16-foot bay channel and continuing easterly from the entrance channel, a triangular area 12 feet deep would extend to within 200 feet of the mainland shore; thence a channel 12 feet deep and 200 feet wide would extend northerly from this area to a turning basin, 12 feet deep and 500 feet square, along the Morro water front. The existing entrance would be closed with waste rock and dredged material. (See enclosure 1, sheet 3.)[1]

39. *Quantities and costs.*—The estimated quantities and costs of the plans are as follows:

[1] Not printed.

Estimated quantities and costs

PLAN A

Dredging 1,580,000 cubic yards, at $0.155	$244, 900
Stone, in place, 192,000 tons, at $2.15	412, 800
Subtotal	657, 700
Engineering and contingencies, about 15 percent	98, 300
Total	756, 000

PLAN B

Dredging 1,520,000 cubic yards, at $0.155	235, 600
Stone, in place, 107,000 tons, at $2.15	230, 000
Removing stone from existing dike, 10,000 tons, at $2	20, 000
Chinking stone, 10,000 tons, at $2 (to prevent movement of sand through the jetty)	20, 000
Subtotal	505, 600
Engineering and contingencies, about 15 percent	75, 400
Total	581, 000

PLAN C

Dredging 1,650,000 cubic yards, at $0.15	247, 500
Stone, in place, 286,000 tons, at $2.10	600, 600
Subtotal	848, 100
Engineering and contingencies, about 15 percent	126, 900
Total	975, 000

40. *Selection of a plan.*—In selecting the most suitable plan of improvement there are a number of common considerations involved, as follows:

(*a*) *Storms and wave action.*—From the northwest to south southwest, there is maximum fetch, and heavy seas may be expected. Normally, seas are moderately large throughout a large part of the year. The more frequent, though lesser, blows are from the northwest, but the most severe storms, which, however, are of infrequent occurrence, are from the southwest. An entrance channel should permit entry into the bay at all times and under all storm conditions and should not, insofar as practicable, permit large waves to enter the bay.

(*b*) *Littoral drift.*—The large accumulation of sand northerly of the stone dike indicates that the littoral drift is southerly. However, there has been no noticeable erosion of the peninsula south of the Morro Bay entrance since the bay dike was completed. Hence it is believed that the actual sand movement along the peninsula ocean beach is small. There is no conclusive evidence that sand passes in either direction around Morro Rock.

(*c*) *Dimensions of entrance channel.*—The district engineer considers that an entrance channel 16 feet deep is the minimum which will permit the safe entry of all recreational craft and fishing vessels under severe storm conditions and thereby provide a satisfactory harbor of refuge. An entrance channel 16 feet deep must be at least 350 feet wide to provide a channel cross section which will reduce tidal velocities sufficiently for safe navigation and eliminate erosive velocities along the bay shore, near the entrance.

(*d*) *Dimensions of bay channel.*—Only a very small percentage of pleasure craft and fishing boats draw over 12 feet and that depth is considered sufficient for the bay channels at this time. Vessels drawing more than 12 feet may, under ordinary conditions, enter the harbor through the 16-foot entrance channel and, in plans A and B, anchor in a 16-foot basin, just inside the entrance or, in plan C, proceed to areas within the bay wherein natural depths are in excess of 16 feet. To care for the volume of traffic anticipated, it is believed that channels 200 feet wide should be provided to the Morro turning basin, and that channels 150 feet wide are satisfactory for other parts of the bay.

(*e*) *Turning basin.*—In order to provide turning basin and anchorage areas for vessels along the Morro water front, each of the plans considered provides for a turning basin 12 feet deep and 500 feet square adjacent to the town of Morro.

(*f*) *Disposal of dredged material.*—To provide public access to the water front, the plans provide for filling a 200-foot strip between the bay channel and the high-tide line along the mainland bay shore. The reclaimed area will be public lands, and a water front roadway paralleling the channel should be provided to give access to the water front. Public piers can be provided and private piers erected on the mainland shore of this channel. Dredged material would be used under plans B and C to close the existing entrance. The excess material would be deposited on the ocean beach.

(*g*) *Maintenance.*—For plans A and C it is estimated that annual maintenance would be $20,000; $10,000 for dredging and $10,000 for breakwater or jetty repair. For plan B the estimated annual cost of maintenance is $5,000 for jetty repairs and $10,000 for dredging, a total of $15,000.

(*h*) *Future development.*—All of the three plans considered, A, B, and C, will permit future enlargement or extension of the project. Future needs in this area are difficult to predict. Accordingly, the plans have been drawn to provide for either the enlargement of the recreational boating and fishing harbor, the development of a commercial harbor, and, possibly, a seaplane basin in the southern end of the bay.

41. *Comparison of various plans.*—

(*a*) *Plan A.*—This plan provides the greatest protection for the entrance channel. It will be only on rare occasions, if ever, that waves will approach the shore at such an angle as to enter the entrance channel. Thus the harbor will be well protected from wave action, and only that part of the bay adjacent to the existing stone dike would ever be subjected to strong wave action. The 1,000-foot breakwater will provide shelter under its lee, which can be used by vessels drawing 16 feet or more, and which would afford a readily available protected area for vessels in time of storm. The entrance channel can be widened at some future date, if it is found desirable, by dredging material from the northerly end of the peninsula; or if conditions should require that the channel lead more directly into the bay to eliminate a part of the curved channel, this can be done at small cost. The breakwater can be extended on the same alinement to greater depths, if later found desirable, to provide a larger sheltered outer harbor area and additional protection to the entrance. Since the northward littoral drift is small, it is believed that a groin or sand barrier extending seaward from the peninsula and southerly of the entrance channel, is not needed. The entrance channel as planned will tend to scour its northerly side and to deposit material on the tip of the peninsula, probably making a protective revetment on the peninsula unnecessary. However, the dimensions of the entrance channel and the adjacent basin have been planned so that the velocities along the convex side of the channel will be noneroding, and, therefore, this locality should require no protection, other than the existing dike. An advantage of plan A is that it more closely follows natural conditions, and its effects are therefore more predictable than those of the other plans.

(*b*) *Plan B.*—The advantages of this plan are that it is less costly than either of the other two considered, and provides the most direct entrance from the sea to Morro. The principal disadvantage of the plan is that the prevailing "trade wind" waves would travel directly into the channel and probably into the bay, thus causing it to be somewhat rough, and possibly causing erosion on the mainland shore along the Morro water front and increasing wave action there. This wave action would probably require protection of the shore by spur dike, or by a bulkhead or revetment. The direction of the prevailing "trade wind" about coincides with the line of the channel and therefore it would be more difficult for sailing craft to leave the harbor. Another disadvantage of this plan is that it severs direct land connection to Morro Rock, which is an attraction to recreationists. Being only 16 feet deep, large waves might break in the entrance channel, a condition extremely hazardous to navigation.

(*c*) *Plan C.*—The principal disadvantage of this plan is its large cost; and its principal advantages are that it would permit land connection via Morro Rock to the northerly end of the peninsula, and would provide direct entrance into the central part of the bay, which would be advantageous if and when a large volume of traffic is developed and more southerly parts of the bay are used. The plan would tend to encourage more uniform development around the entire bay than the plans which provide an entrance into its northerly end. Such an entrance channel would permit large waves to enter the bay, and thereby might cause erosion of the mainland shore. It would also permit unusually large waves to break in the

entrance channel, a condition which would be highly undesirable. Jetties in this plan are to be spaced 1,000 feet apart so as to provide for possible deepening of the entrance channel. The entrance channel could not be so easily located and entered by vessels approaching from the open sea as the entrances adjacent to Morro Rock, since the rock is a landmark normally visible for many miles and affords some protection from rough seas and shelter from high winds.

42. *Views of local interests on the plans.*—A conference was held with the San Luis Obispo County Board of Supervisors and representative local interests. An entrance adjacent to Morro Rock was the most favored plan, but local interests were about equally divided in favoring plans A and B. The principal objection to plan C was its cost and fishermen were of the opinion that the entrance might not be satisfactory, since it provided little or no protection from storms for boats entering or leaving the harbor. Also, it was pointed out that it was advantageous to follow nature's plan in providing an entrance adjacent to the rock.

43. *Plan recommended by the district engineer.*—Considering the advantages and disadvantages of the three plans and the costs involved, the district engineer is of the opinion that plan A is the most suitable for improvement of the bay at this time. It provides the greatest protection, is susceptible to future enlargement, and permits maintenance of the existing land connection to Morro Rock.

OTHER SPECIAL SUBJECTS

44. *Shore-line changes.*—It is believed that improvement of the bay called for by plan A will cause no shore-line changes either north or south of the entrance channel, since the existing entrance is only to be enlarged, and since the proposed breakwater extending southerly from Morro Rock will be in effect an extension of the rock.

45. *Coordination with other improvements.*—There are no questions of flood control, terminal facilities, reclamation of Federal lands, or other related subjects that could be coordinated with the improvement so as to lessen the cost or compensate the United States for any expenditure that may be made in the interest of navigation.

46. *Seaplane basin.*—In its natural condition the bay includes no areas that are suitable for seaplane operation, nor would one be provided by the proposed improvement. The central and southern part of the bay, which would not be affected by the improvement, could probably be developed into a satisfactory seaplane basin. The Civil Aeronautics Authority advises that extension of the improvement to provide a seaplane basin is not warranted at this time.

47. *Effects on wildlife.*—The recommended plan of improvement will have no adverse effects on wildlife. It might serve to improve the fishing in Morro Bay.

48. *Survey.*—The topography and hydrography of the portion of the bay wherein improvements are proposed were determined by instrumental surveys made for this report. The topography and hydrography of other portions of the bay were taken from latest available maps. Fourteen borings were made to augment previous borings, in order to determine subsurface conditions more accurately.

DISCUSSION

49. It is believed that this natural waterway should be preserved for public use and not allowed to deteriorate. Harbors for fishing boats, pleasure craft, and recreation in southern California are usually far apart, and the development of additional harbors will increase business and recreation activities and be of value to the general public. If improved, Morro Bay will serve as a harbor of refuge about midway of a 230-mile length of coast now affording but limited protection to small craft. The direct commercial benefits from the desired improvement are now limited to fishing. Increased use of pleasure craft results indirectly in an increase in commerce through the employment of crews and expenditures for equipment, depreciation, taxes, supplies, and the like. Public recreation is a large factor in the proposed development. Definite monetary values cannot be assigned to these benefits. Some of the fishing will be new business, and some will be diverted from other places. The transfer of California pleasure craft to Morro Bay cannot be considered a loss to the other harbors, since the increase in the number of such craft will probably more than offset any such loss.

50. *Other harbors.*—Port San Luis, southerly of Morro Bay, cannot be considered a comparable and competitive development, nor does its failure to attract pleasure craft indicate that Morro Bay would fail to do so. It is essentially an oil port. Except for a small section, the Port San Luis water front is privately controlled, and no attempt has been made to provide for, or to attract, pleasure or fishing craft to the harbor. Most of the terrain surrounding the harbor is hilly and steep to the water's edge, precluding extensive recreational or residential development, even if the private owners were favorable to such development. The harbor is largely unprotected from southerly storms, and the safe anchorage of small craft is a difficult problem, due to surge or ground swell. Also, the area of protected water is limited and not attractive to pleasure craft operators. On the other hand, Morro Bay is landlocked and surrounded by terrain favorable for residential and other similar development, and the calm waters of the bay provide safe and attractive anchorage and permit all-year operation of smaller craft.

51. *Justification for improvement.*—

(*a*) *General.*—Morro Bay is a potential recreation center because of its natural setting and surroundings and its location in relation to a large tributary area and the State's two principal centers of population. The State Park development is now beginning to attract large numbers of visitors to Morro Bay. With this and the improvement of the bay, including adequate facilities for boating, and the proper direction of the bay development, so that the public may have easy access thereto and unobstructed use of the water front, private development will also be accelerated. With such improvements, Morro Bay will probably grow into a recreational resort of importance, since it is one of the few places in the State where public development of the water front is now practicable without large expenditures for the purchase of property.

(*b*) *Comparable development.*—Newport Bay Harbor, Calif., an improvement used almost exclusively by pleasure craft and fishing boats, is considered to be comparable to Morro Bay in many respects. Since there is not so large a population tributary to Morro Bay as to Newport Bay, the development of Morro Bay will be slower than at Newport, but similar. Newport Bay Harbor is commonly regarded as a successful improvement. Several comparisons of the desired Morro Bay improvement with Newport Bay Harbor are made in the following paragraphs.

(*c*) *Pleasure craft.*—In the United States, as a whole, there were in 1939, 1.84 registered pleasure boats per 1,000 of population. In southern California the ratio of the total number of pleasure boats to registered boats is 6 to 5. If boats were owned in the area tributary to Morro Bay in this same proportion as for the entire United States, and if these boats were kept at Morro Bay, there would be about 1,100 pleasure craft therein. However, due to the distances and dispersion of population in seeking recreation, it is assumed that about 30 percent, or say 300 pleasure boats, would be kept at Morro Bay, if suitably improved. This number of craft would probably be attained in 5 years after completion of the improvement. The boats would probably be about the same size as the craft now used in southern California, or about 28 feet in length, and, when new, would cost about $7,000 each. Each average owner would probably spend about $750 a year, or about $225,000, for operation and maintenance, and the total capital investment in the boats would be about $2,100,000. After improvement, the number of pleasure craft visiting Morro Bay annually from other ports would probably amount to a total of 200. Operators of each boat would probably average to spend about $25 per visit at Morro, making a total expenditure of $5,000 per annum. Development of the harbor would stimulate interest in and cause an increase in the number of pleasure craft owned and operated in southern California.

(*d*) *Commercial fishing.*—Commercial fishing is a major industry in California. The State production exceeds that of Alaska or any other State. In 1937, the California catch of fish and shellfish amounted to 676,000 tons, or 31 percent of the entire United States production. The California fishing industry employs about 16,000 people. At present there is no suitable harbor for fishing craft, and the shore facilities required in connection therewith, between Monterey (110 miles north) and Santa Barbara (120 miles south). The latter port is too far from the best fishing grounds and is not entirely satisfactory, since it is occupied nearly to capacity by pleasure craft and is largely a recreational harbor, with a public bathing beach and limited commercial facilities. Consequently, the area midway between Santa Barbara and Monterey, in the vicinity of Morro Bay, is not so extensively fished as the areas closer to the improved harbors. Although depletion of the fish supply in coastal waters has recently resulted in a slight decrease in the annual California catch, improvement of Morro Bay will cause an increased number of fishing boats to operate therefrom, with probably one or more canneries in the harbor. If Morro Bay were improved, it would be of considerable benefit, since the longer trips to other harbors could be eliminated, thus saving the time of the boats and crews. Furthermore, the fish could be delivered ashore in better condition than is now possible. It is estimated that 100 fishing boats, valued at $120,000, would base at Morro; that over 300 people would be employed in the fishing industry, and that the production of fish and fish products would probably amount to $500,000 annually. During 1938 the fishing industry at Newport Bay Harbor, Calif., had 236 fishing boats, valued at $283,000, employing 472 people on a yearly pay roll of $472,000, and 3 fish canneries were in operation with an estimated value of $125,000, employing 215 people on an annual pay roll of $115,000. This industry flourished in spite of its proximity to the well-developed facilities at Los Angeles Harbor.

(*e*) *Commercial, excursion, and charter fishing boats.*—Sport fishing is an important business in California. Craft for this purpose, together with miscellaneous excursion boats, work boats, and the like, which would probably make Morro Bay their home port, are estimated at 25, with a value of $37,500, employing 35 people on an annual pay roll of $25,000. In 1938, Newport had 81 such craft, valued at $121,000, and employing 125 people on an annual pay roll of $162,000.

(*f*) *Business related to boating.*—Improvement of Morro Bay as a boating center would probably result in the establishment of about 6 boatbuilding and repair works, 2 marine supply stores, and 2 marine fueling stations in the harbor. It is estimated that they would have a combined value of $155,000, would employ 25 people, and would do an annual business of $100,000. Newport Bay has 26 such establishments, employing 118 people and doing an annual business of $640,000.

(*g*) *Other developments related to boating.*—Other developments appurtenant to pleasure craft and fish-boat operation would be the construction of private piers, slips, and docks for private use, or for hire. The number and value of such structures are difficult to estimate, but it is believed that not less than $50,000 would be expended for such improvements within a few years.

(*h*) *Area reclaimed.*—Filling of a strip along the Morro water front, as proposed under plan A, would reclaim about 15 acres for public use. Water-front property

is usually the most valuable land in the vicinity of any harbor. The estimated value is $1,000 an acre, which, if applied to this reclaimed area, gives a total value of $15,000.

(*i*) *Increase in population and values.*—Improvement of the harbor for use by pleasure craft and fishing boats will cause an increase in the local population and other developments, which, in turn, will greatly increase both the total and unit values of adjacent lands. The amount of such increase is difficult to predict, but it might be stated that, for the city of Newport Beach, the average value of land increased in the 20-year period, 1918 to 1938, from $3,089 per acre to $11,678 per acre. Meanwhile, the permanent population of the city increased from 800 to 5,800, and the summer population from 2,000 to 17,000.

52. *Federal interest.*—The benefits to accrue from the desired improvement are not susceptible of monetary evaluation, and definite segregation into local and general benefits is impossible. However, benefits from the improved harbor will accrue to many people over a considerable area. It is therefore believed to be in the interest of general navigation to restore and improve the navigable capacity of the bay and prevent further deterioration.

53. *Rights-of-way.*—At present, title to a portion of the land below high-tide line along the Morro water front, which would be filled as a part of the proposed improvement, is claimed by a number of persons. In order to establish the right of title to these lands after they are filled, local interests, as an item of local cooperation, should take appropriate action to insure that title to these lands will rest with the public when they are reclaimed with dredged material.

54. *Cooperation required.*—The improvement should be made under the conditions that local interests should, subject to approval of the Secretary of War and supervision of the Chief of Engineers: (*a*) Furnish the necessary rights-of-way for the improvement and disposal areas; (*b*) construct and maintain a roadway to and along the Morro water front on the area to be reclaimed, in order to give proper access to the water front; (*c*) provide adequate public pier or piers and anchorage facilities; (*d*) provide the necessary public slips and moorings; and (*e*) provide for the sale of potable water, motor fuel, and lubricants for boats at reasonable prices and on equal terms to all. It is estimated that the cost to local interests would be less than $50,000. Local interests are favorable to the plan of development and will probably provide the required cooperation within a short time after the project is approved.

55. *Cost analysis.*—The estimated annual costs of the proposed plan A of improvement for Morro Bay and entrance thereto follow:

(*a*) Federal investment:		
(1) Cost to the Engineer Department for dredging and jetty construction	$756,000	
(2) Cost to other Federal agencies for aids to navigation, etc	15,000	
(3) Total Federal first cost equals net Federal investment	771,000	
(*b*) Federal annual charges:		
(1) Interest at 3½ percent on net Federal investment	26,985	
(2) Amortization of net Federal investment, 50-year life, at 3½ percent, 0.00763	5,827	
(3) Cost of maintenance of harbor	20,000	
(4) Cost of maintenance of aids to navigation	2,000	
(5) Gross Federal annual charges equals net Federal annual charges		$54,812

(*c*)	Non-Federal investment:		
	(1) Estimated cost of local cooperation	$50,000	
	(2) Total non-Federal first cost equals non-Federal investment	50,000	
(*d*)	Non-Federal annual charges:		
	(1) Interest at 4½ percent on net non-Federal investment	2,250	
	(2) Amortization of net non-Federal investment, 25-year life, at 4½ percent, 0.02244	1,122	
	(3) Cost of maintenance and operation	5,000	
	(4) Gross non-Federal annual charges	8,372	
	(5) Less annual income from lands, concessions, etc.	−5,000	
	(6) Net non-Federal annual charges		$3,372
(*e*)	Total annual charges		58,184

56. *Summary.*—The district engineer believes that the improvement of Morro Bay in accordance with plan A is justified for the following general reasons:

(*a*) Preserving a deteriorating natural waterway of considerable value.
(*b*) Providing a needed harbor suitable for a large number of pleasure craft, and for fishing boats and recreational activities.
(*c*) Providing a harbor which will materially assist the fishing industry.
(*d*) Developing a suitable port of call and a harbor of refuge for pleasure and fishing boats and other smaller craft.
(*e*) Increasing local business, with resultant increase in development of the region.

RECOMMENDATIONS

57. The district engineer recommends that Morro Bay, Calif., and the entrance thereto be improved by the United States in accordance with plan A, outlined in paragraph 38 (*a*), to provide an entrance channel through the existing entrance to the bay, a breakwater extending about south by west from Morro Rock to protect the entrance channel, bay channels to provide access to the Morro water front, and a turning basin along the Morro water front. The estimated Federal cost of new work is $756,000, and the estimated annual maintenance cost is $20,000. The improvement should be made subject to the requirements of local cooperation called for by paragraph 54. In the interest of economy Federal funds for the entire improvement should be provided in one allotment.

EDWIN C. KELTON,
Lieutenant Colonel, Corps of Engineers,
District Engineer.

[First endorsement]

OFFICE OF THE DIVISION ENGINEER,
SOUTH PACIFIC DIVISION,
San Francisco, September 3, 1940.

To the CHIEF OF ENGINEERS, UNITED STATES ARMY.

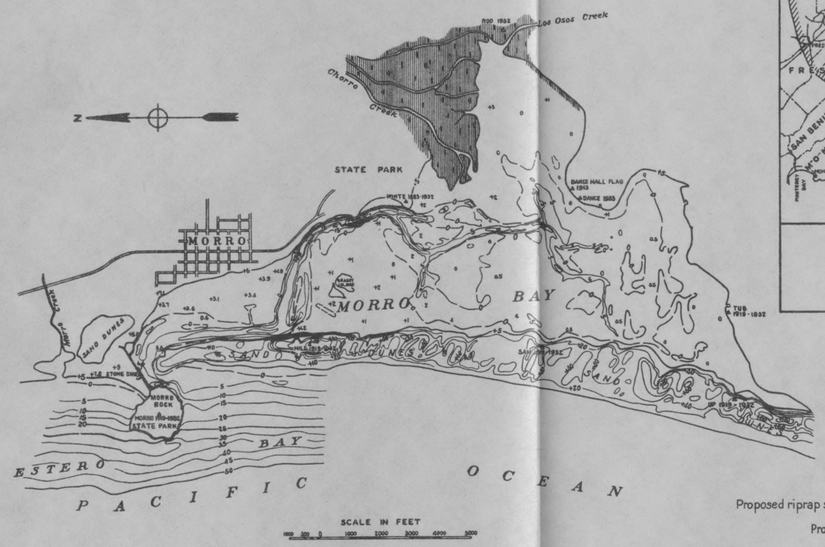
The division engineer concurs in the views and recommendations of the district engineer.

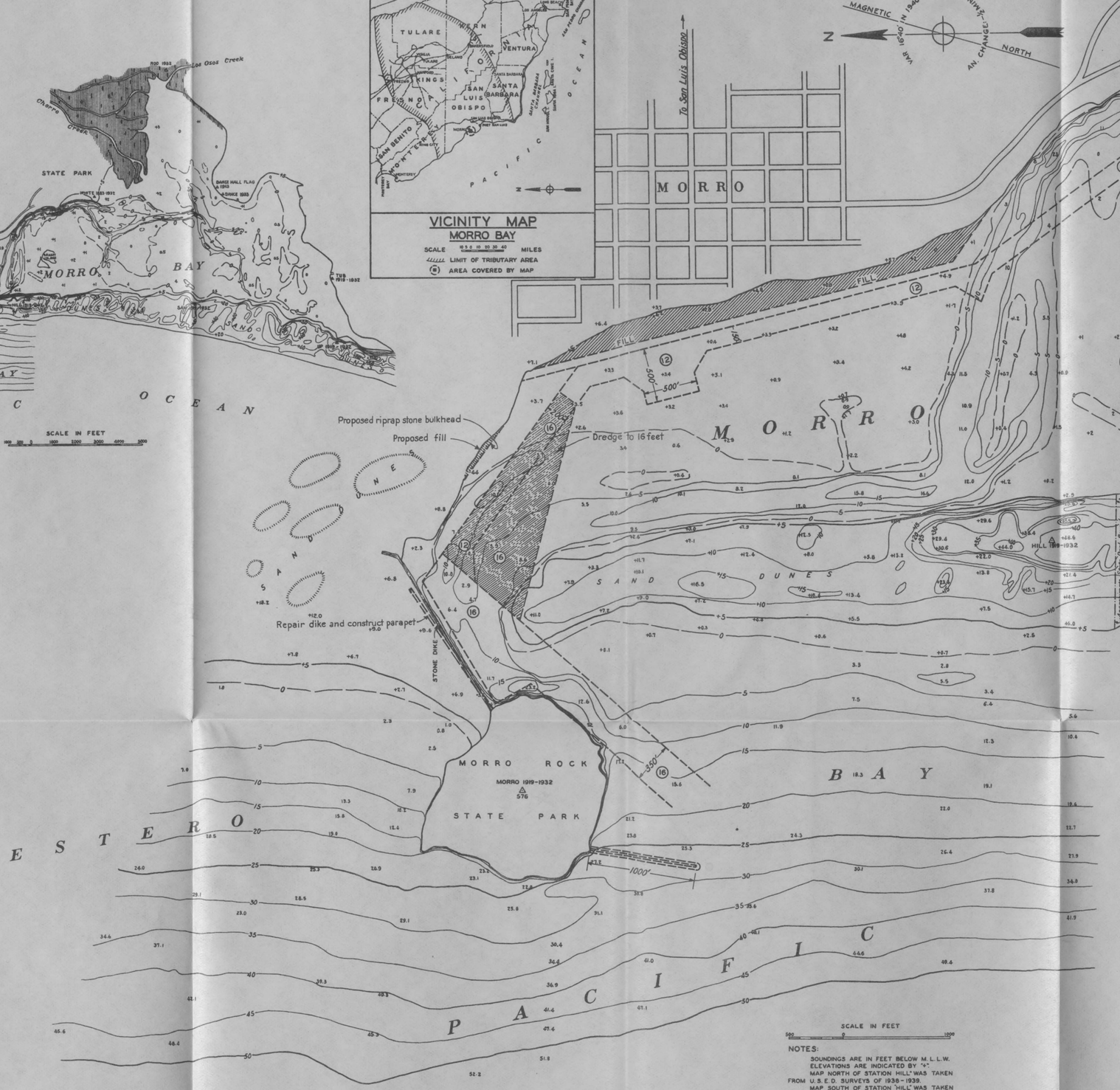
WARREN T. HANNUM,
Colonel, Corps of Engineers,
Division Engineer.

○

VICINITY MAP
MORRO BAY

SCALE 10 5 0 10 20 30 40 MILES
LIMIT OF TRIBUTARY AREA
AREA COVERED BY MAP





NOTES:
SOUNDINGS ARE IN FEET BELOW M.L.L.W.
ELEVATIONS ARE INDICATED BY "+"
MAP NORTH OF STATION HILL WAS TAKEN FROM U.S.E.D. SURVEYS OF 1938-1939.
MAP SOUTH OF STATION HILL WAS TAKEN FROM U.S.G.S. SURVEY OF 1935 AND U.S.E.D. RECONNAISSANCE SURVEY OF 1938.

NOTE:
Additional dredging recommended by Navy Dept.

MORRO BAY, CALIFORNIA, REVIEW OF REPORTS

PLAN OF IMPROVEMENT
PLAN "A"
(Recommended)

SCALES AS SHOWN — IN 4 SHEETS — SHEET NO. 1

DATUM IS MEAN LOWER LOW WATER

U.S. ENGINEER OFFICE, LOS ANGELES, CALIF., JUNE 1940

SUBMITTED BY:			APPROVED BY:
CAPTAIN, CORPS OF ENGINEERS, U.S. ARMY CHIEF, ENGINEERING DIVISION			LT. COL., CORPS OF ENGINEERS, U.S. ARMY DISTRICT ENGINEER
FILE NO. 2567	DRAWN J.P.O.	TRACED J.P.O.	CHECKED C.K.L. G.F.W.
TO ACCOMPANY REPORT DATED: JUNE 15, 1940			

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